

DAR WHAP Fish Surveys Notes

Data are from underwater visual surveys of fish stocks at 23 sites in West Hawaii. Survey sites are 8 to 14 m deep and are all located on reef shelves with moderate to high *Porites compressa* cover (the predominant habitat type at that depth on West Hawaii reefs, and the key habitat for the majority of fishes harvested for the aquarium trade. The survey program began as the West Hawaii Aquarium Project (WHAP) but since 2004 has continued as part of DAR's Main Hawaiian Islands Coral Reef Monitoring Program.

Table 1. WHAP monitoring sites with corresponding coordinates and depth.

Site (Local ID)	District	Latitude	Longitude	Mean Depth (m)
Lapakahi (01)	N. Kohala	20.160	-155.900	12.1
Kamilo Gulch (02)	N. Kohala	20.081	-155.868	12.8
Waiakailio Bay (03)	N. Kohala	20.074	-155.865	13.4
Puako (04)	S. Kohala	19.970	-155.849	9.2
Anaeho`omalu Bay (05)	S. Kohala	19.953	-155.866	10.0
Keawaiki (06)	N. Kona	19.891	-155.910	13.3
Ka`upulehu (07)	N. Kona	19.844	-155.981	11.4
Makalawena (08)	N. Kona	19.797	-156.033	10.2
Ho`ona / Unualoha Pt	N. Kona	19.743	-156.056	12.4
Wawaloli Beach (09)	N. Kona	19.709	-156.049	9.8
Wawaloli (10)	N. Kona	19.700	-156.050	13.6
Kaloko-Honokohau (11)	N. Kona	19.671	-156.030	13.1
Papawai (13)	N. Kona	19.647	-156.023	10.4
S. Oneo Bay (14)	N. Kona	19.631	-155.993	12.0
Keauhou (15)	N. Kona	19.568	-155.969	12.0
Kualanui Pt (16)	N. Kona	19.548	-155.962	11.3
Red Hill (17)	S. Kona	19.505	-155.953	13.9
Keopuka (18)	S. Kona	19.483	-155.946	10.3
K Bay (19)	S. Kona	19.479	-155.933	8.0
Ke`ei (20)	S. Kona	19.463	-155.927	11.5
Ho`okena (Kalahiki) (21)	S. Kona	19.369	-155.897	11.1
Ho`okena (Auau) (22)	S. Kona	19.298	-155.890	13.6
Miloli`i/Honomalino (23)	S. Kona	19.167	-155.913	12.3
Manuka (24)	Ka`u	19.077	-155.904	12.0

Methods

Surveys are conducted in 'rounds' – each site being surveyed once per round. 4 to 6 rounds have been conducted per year and in total 39 rounds have been conducted.

Each survey of a site generally involves 4 divers (2 pairs), who between them conduct (i) 'WHAP' surveys of the four 25m *4m permanently-located transects per site; and (ii) 10-minute freeswims (presence-absence swims),

The WHAP fish protocol is based on fixed transects which can be closely surveyed for targeted species of all size classes, and where variability among fish populations can be related to fine-scale habitat variability among transects and sites. Six stainless steel

eyebolts have been permanently drilled and cemented into the bottom to establish reference locations for four permanent 25m transects at each site. For efficiency during WHAP they have been situated in an H-shaped design at each study site. A transect width of 4m is utilized based on previous sampling experience with coral reef fishes in Hawai'i. The species, size class (in 5cm slots), and in some cases phase (e.g. 'recruit') of all fishes on transects are counted by a pair of divers in each survey. Divers first lay out transect lines between end pins, then swim one rapid swim to count mobile and mid-water species and then a return swim in which divers slowly and carefully swim the transect carefully recording fishes in and around the benthos. Transect lines are taken up after all transects have been completed.

In addition to the fixed transects at each site, a **10 minute roving 'free-swim' survey** is done by a team of two divers after the fixed transect surveys are completed. The divers range about the areas adjacent to transects ($\approx 5000\text{m}^2$) recording the presence of fish species which were not observed on the transects.

Data Available

The DAR administrator has determined that DAR will distribute all raw WHAP-survey data which is more than 5 years old, but only summarized versions of newer data.

Therefore the current West Hawaii data file (DAR West Hawaii Fish Surveys.xls) contains 3 worksheets:

- (1) Raw Transect Data (1999-2000)**- raw data from 1999 and 2000 (all information given –broken down by transect and by observer; and including size or age-class information);
- (2) Summary Transect Data (2001-5)**- summarized data from 1999 and 2000 (data pooled by site, no information given on transect. Observer, age-phase or size class);
- (3) 10min Free-Swim Data** - being all data from the 10 minute presence absence survey of the area surrounding the transects. **Important point – only fishes NOT observed on transects are included in the presence-absence survey worksheet** (so need to pool free-swim and transect data to get complete presence-absence list).